



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,257	03/02/2004	Carl Stephen Arnold	2003-126-TAP	2795
7590 12/12/2005 Timothy R. Schulte Storage Technology Corporation One StorageTek Drive Louisville, CO 80028-4309			EXAMINER BERNATZ, KEVIN M	
			ART UNIT 1773	PAPER NUMBER
DATE MAILED: 12/12/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/791,257

Applicant(s)

ARNOLD ET AL.

Examiner

Kevin M. Bernatz

Art Unit

1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 18-21 is/are pending in the application.
- 4a) Of the above claim(s) 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 18 and 21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1 – 4, 6, 7, 9 and 11 – 13, cancellation of claims 14 – 17, and addition of new claim 21, filed on October 5, 2005, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Election/Restriction

3. Applicants' confirmation of the election without traverse of Group I, claims 1 – 18 is acknowledged. The requirement is still deemed proper and is therefore made FINAL.

Drawings

4. Figure 6 is objected to as being unclear. In one aspect of Figure 6, it appears that the permanent magnet (*element 640*) is adjacent the sides of the MR element (*element 620*), but part of the element extends above (or below?) the permanent magnet (*elements 610*). Yet the apparent "side view" included in Figure 6 shows the permanent magnet stopping at the base of the MR element and not extending adjacent to it, much less on top or bottom of it. It appears that at least one aspect of this drawing is incorrect. Applicants are reminded that any correction to the Figure must have support in the as-filed disclosure or it will be considered as new matter.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1, 2, 11 – 13, 18 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation “a permanent magnet layer disposed under the antiferromagnetic layer, the non-magnetic spacer layer, the pinned layer, and the free layer, and the gap layer” is not supported by applicants’ as-filed disclosure. Specifically, the confusion stems from Figure 6, which is what applicants’ appear to be relying upon for the disclosed subject matter. In Figure 6, it appears that the permanent magnet is only along the sides of the MR element and not “under the antiferromagnetic layer, the non-magnetic spacer layer, the pinned layer, and the free layer, and the gap layer”. Clarification is requested.

7. Claims 1, 2, 11 – 13, 18 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The examiner reminds the applicant(s) that any negative limitation or exclusionary proviso must have basis in the original disclosure. See *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983), *aff'd mem.*, 738 F.2d 453 (Fed. Cir. 1984). **The mere absence of a positive recitation is not basis for an exclusion** (see MPEP § 2173.05(i)). In the instant case the limitation “wherein the at least one stabilizer depression does not extend into the permanent magnet layer” does not appear to have sufficient basis in the original disclosure.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1 – 12 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Hasegawa et al. (U.S. Patent App. No. 2004/0067389 A1) for the reasons of record as set forth in Paragraph No. 11 of the Office Action mailed on July 5, 2005.

Regarding amended claims 1 and 11, Hasegawa et al. disclose a MR sensor comprising an antiferromagnetic (AFM) layer (*Figure 2, element 20*), a non-magnetic

Art Unit: 1773

spacer layer (*element 15*), a pinned layer (*element 16*) disposed between the AFM layer and the spacer layer, wherein the pinned layer is adjacent to both the AFM layer and the spacer layer (*elements 15, 16 and 20*), a free layer (*element 14*) disposed adjacent the spacer layer, a non-magnetic layer (i.e. applicants' "gap layer") (*element 115*) disposed under the AFM layer, the spacer layer, the pinned layer and the free layer, a magnetic layer (i.e. applicants' "permanent magnet layer") (*element 116*) disposed under the AFM layer, the spacer layer, the pinned layer, the free layer and the gap layer, at least one stabilizing depression (*depression between elements 20*) formed in at least one of the AFM layer, the spacer layer, the pinned layer, the free layer, and/or the gap layer, wherein the stabilizing depression does not extend into the permanent magnet layer (*the depression in elements 20 does not extend through to element 116*).

Regarding claims 2 and 12, the free layer (*element 14*) is disposed between the spacer layer (*element 15*) and the gap layer (*element 115*).

Regarding claims 3 – 10, these limitations are disclosed for the reasons of record as set forth in Paragraph No. 11 of the Office Action mailed on July 5, 2005 (the Examiner wishes to call attention to the fact that some of the layers used to meet the limitations of claim 3 are different than those used to meet the limitations of claim 1, above).

Art Unit: 1773

10. Claims 1, 8, 11, 13, 18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Mao et al. (U.S. Patent No. 6,396,668).

Regarding claims 1 and 11, Mao et al. disclose a MR sensor comprising an antiferromagnetic (AFM) layer (*Figure 5, element 198A + 198B*), a non-magnetic spacer layer (*element 190*), a pinned layer (*element 196A and 196B*) disposed between the AFM layer and the spacer layer, wherein the pinned layer is adjacent to both the AFM layer and the spacer layer (*elements 190, 196A/B, 198A/B*), a free layer (*element 188*) disposed adjacent the spacer layer, a gap layer (*element 200*) disposed under the AFM layer, the spacer layer, the pinned layer and the free layer, a bottom shield layer (i.e. applicants' "permanent magnet layer") (*element 202*) disposed under the AFM layer, the spacer layer, the pinned layer, the free layer and the gap layer, at least one stabilizing depression (*depression between elements 194A/196A/198A and 194B/196B/198B*) formed in at least one of the AFM layer, the spacer layer, the pinned layer, the free layer, and/or the gap layer, wherein the stabilizing depression does not extend into the permanent magnet layer (*the depression between elements 194A/196A/198A and 194B/196B/198B does not extend through to element 202*).

Regarding claim 8 and 18, Mao et al. disclose magnetic heads meeting applicants' claimed limitations (*Title*).

Regarding claims 13 and 21, Mao et al. disclose the free layer (*element 188*) disposed adjacent the non-magnetic spacer layer (*element 190*) and opposite the gap layer (*element 200*) such that the magnetoresistive sensor forms a bottom spin valve sensor.

11. Claims 1, 2, 8, 11 - 13, 18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hasegawa et al. (U.S. Patent App. No. 2004/0008455 A1).

Regarding claims 1 and 11, Hasegawa et al. ('455 A1) disclose a MR sensor comprising an antiferromagnetic (AFM) layer (*Figure 6, element 12*), a non-magnetic spacer layer (*element 14*), a pinned layer (*element 13*) disposed between the AFM layer and the spacer layer, wherein the pinned layer is adjacent to both the AFM layer and the spacer layer (*elements 12, 13, 14*), a free layer (*element 15*) disposed adjacent the spacer layer, a gap layer (*element 32*) disposed under the AFM layer, the spacer layer, the pinned layer and the free layer, a bottom shield layer (i.e. applicants' "permanent magnet layer") (*element 31*) disposed under the AFM layer, the spacer layer, the pinned layer, the free layer and the gap layer, at least one stabilizing depression (*depression in elements 12, 13, 14, and 15*) formed in at least one of the AFM layer, the spacer layer, the pinned layer, the free layer, and/or the gap layer, wherein the stabilizing depression does not extend into the permanent magnet layer (*the depression in elements 12, 13, 14 and 15 does not extend through to element 31*).

Regarding claims 2 and 12, Hasegawa et al. ('455 A1) disclose embodiments wherein the order of elements 12, 13, 14 and 15 are reversed (e.g. see *claims 1 and 10 in Hasegawa et al. '455 A1*), hence meeting the claimed limitations of the free layer being disposed between the spacer layer and the gap layer such that the MR sensor forms a top spin valve sensor.

Regarding claim 8 and 18, Hasegawa et al. ('455 A1) disclose magnetic heads meeting applicants' claimed limitations (*Paragraph 0002*).

Regarding claims 13 and 21, Hasegawa et al. ('455 A1) disclose the free layer (*element 15*) disposed adjacent the non-magnetic spacer layer (*element 14*) and opposite the gap layer (*element 32*) such that the magnetoresistive sensor forms a bottom spin valve sensor.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. ('455 A1) as applied above.

Hasegawa et al. ('455 A1) is relied upon as described above.

While the Examiner maintains that Hasegawa et al. ('455 A1) provides sufficient information to anticipate claims 2 and 12 for the reasons cited above, the Examiner acknowledges that Hasegawa et al. ('455 A1) fail to explicitly disclose such an embodiment in a Figure.

However, since Hasegawa et al. ('455 A1) teach that top spin valve sensors meeting applicants' claimed structural limitations and bottom spin valve sensors meeting applicants' claimed structural limitations are known equivalent spin valve

Art Unit: 1773

sensor structures (e.g. *claims 1 and 10 of Hasegawa et al. '455 A1*), the Examiner deems that modification of the structure of Figure 6 to reverse the order of layers 12 – 15 would have been an obvious variant within the knowledge of one of ordinary skill.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant(s) invention to modify the device of Hasegawa et al. ('455 A1) to produce a top spin valve sensor meeting applicants' claimed limitations, since such a structure would be accomplished by the taught reversing of layers 12 – 15, which is a known equivalent structure to that disclosed in Figure 6.

Response to Arguments

14. The rejection of claims 1 – 13 and 18 under 35 U.S.C § 102(a) and/or (e) – Min et al.

The above noted rejection has been withdrawn in view of applicant(s) arguments, which have been found persuasive. Specifically, applicant(s) argue that Min fails to disclose the at least one stabilizing depression not extending into the permanent magnetic layer, which is deemed to not be anticipated, nor rendered obvious, by the above noted rejection.

**15. The rejection of claims 1 – 13, 18 and 21 under 35 U.S.C § 102(e) –
Hasegawa et al. ('389 A1).**

Applicant(s) argue(s) that Hasegawa et al. ('389 A1) “does not show the claimed feature that at least one stabilizer depression does not extend into the permanent magnetic layer” (*page 10 of response*). The examiner respectfully disagrees.

As noted in the rejection of record, when layer 115 is considered to read on the limitation “gap layer” and layer 116 is considered to read on the limitation “permanent magnetic layer”, Hasegawa et al. ('389 A1) meets the claimed limitations. Applicants appear to acknowledge this by stating “nothing else in *Hasegawa* shows a depression extending into a permanent magnetic layer” (*page 11 of response*).

Regarding the arguments presented for the embodiment shown in Figure 3 (i.e. the “bottom” spin valve sensor”), the Examiner agrees with the language cited by applicants (*page 12 of response*), but does not agree with the scope afforded said language. Specifically, applicants argue that the language “with the pinned layer **710**, **860** on either the “top” for a top spin valve sensor, or the “bottom” for a bottom spin valve sensor” excludes additional pinned layers. While applicants' Figures may not show additional pinned layers, the Examiner notes that the language in the specification does not exclude additional pinned layers (or other layers) from being present. The language simply requires a certain relative order between the gap layer, the free magnetic layer, the spacer layer and the pinned layer. Hasegawa et al. ('389 A1) disclose a structure meeting the relative order of layers, and is hence considered to meet the broad recitation of a “bottom spin valve sensor”. Amendments to positively

Art Unit: 1773

claim a single pinned magnetic layer would be deemed sufficient to exclude the multiple pinned layer embodiments.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Several prior art references appear to disclose MR sensors with "depressions" in various layers. While rejections similar to those predicated on Mao et al. and Hasegawa et al. ('455 A1) could be made, the Examiner notes that Mao et al. and Hasegawa et al. ('455 A1) are deemed the closest prior art to the amended claims and any arguments/amendments to overcome the above rejections would be reasonably expected to overcome any rejection predicated on the following references. The pertinent prior art references are: Miyazawa et al. (U.S. Patent App. No. 2001/0026425 A1), Mao et al. (U.S. Patent No. 6,411,478 B1), Okuno et al. (U.S. Patent App. No. 2003/0104249), Sato et al. (U.S. Patent No. 5,923,503), Iwasaki et al. (U.S. Patent No. 6,157,525), Sato et al. (U.S. Patent No. 6,307,722) and Toki et al. (U.S. Patent No. 6,134,091).

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

Art Unit: 1773

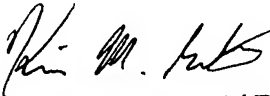
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
December 6, 2005


Kevin M. Bernatz, PhD
Primary Examiner